

Amendment Under 37 C.F.R. §1.111  
Application No. 09/943,610

ExxonMobil Ref. No. 2001B081

## **REMARKS**

### **I. Status of the Claims**

Claims 1-4, 6, 9-18, 20, 22 and 23 are currently pending in the above-identified application; claims 5, 7, 8, 19 and 21 having been previously canceled. By this amendment, claims 1, 6, 9, 10, 12-15 and 22 have been amended, claim 11 has been canceled, and claims 24 and 25 have been added to define the invention in another form. Thus, upon entry of this amendment, claims 1-4, 6, 9-10, 12-18, 20, 22, and 23-25 will be pending in the application. No new matter has been added.

### **II. Rejections under 35 U.S.C. § 112**

Claim 11 stands rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. Claim 11 also stands rejected under 35 U.S.C. §112, second paragraph, as being inconsistent with claim 1. In this Amendment, claim 11 has been canceled without prejudice or disclaimer, thereby rendering these rejections moot.

Claims 1-4, 6 and 9-14 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Specifically, it was asserted that claims 1, 6 and 9 were in improper Markush format. Claims 1, 6 and 9 have been amended herein to recite proper Markush format. Claims 2-4, 10 and 12-14 depend from claim 1, and also recite proper Markush format by reference to amended claim 1. Claim 11 has been canceled. Thus, Applicants respectfully request the withdrawal of the rejection of claims 1-4, 6, 9, 10 and 12-14 under 35 U.S.C. §112, second paragraph, in view of amended claims 1, 6 and 9.

Amendment Under 37 C.F.R. §1.111  
Application No. 09/943,610

ExxonMobil Ref. No. 2001B081

### III. Rejections under 35 U.S.C. § 103

Claims 1-4, 6 and 9-14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Brown et al. (U.S. Patent No. 6,048,816). Claims 1-4, 6, 9-11, 13-18, 20, 22 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Leyshon et al. (U.S. Patent No. 5,026,936) in view of Brown et al. Applicants respectfully traverse these rejections in view of amended independent claims 1 and 15 and the following remarks.

#### A. Brown Fails to Disclose All of the Features of the Claimed Invention.

Claims 1-4, 6 and 9-14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Brown (U.S. Patent No. 6,048,816). Applicants respectfully traverse this rejection in view of amended claim 1.

Independent claim 1, as amended, is directed to a method of making light olefins. The method includes the step of contacting an oxygenate feed with a first zeolite catalyst comprising a ZSM-5 molecular sieve to form a first product. At least a portion of the first product contacts a second zeolite catalyst comprising a zeolite molecular sieve selected from the group consisting of ZSM-22, ZSM-23, ZSM-35, ZSM-48, and mixtures thereof to form a second product.

In contrast to both of these claims, the Brown patent is directed to a process for converting an oxygenate to olefins by contacting the oxygenate with a single catalyst, preferably comprising a ZSM-5 medium pore zeolite. (See Brown et al. at Abstract). Nowhere does the Brown patent teach or suggest forming a first product over a first zeolite catalyst, and forming a second product from the first product over a second zeolite catalyst as recited in claim 1 of the present application. Accordingly, Applicants respectfully request the withdrawal of the rejection of claims 1-4, 6 and 9-14.

Amendment Under 37 C.F.R. §1.111  
Application No. 09/943,610

ExxonMobil Ref. No. 2001B081

Relying on *In re Kerkhoven*, 205 U.S.P.Q. 1069 (CCPA 1980), it was asserted in the January 22, 2004 Office Action that it would have been obvious to have modified Brown by using both ZSM-5 and ZSM-35 as the oxygenate conversion catalyst since it is *prima facie obvious* to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose. (1/22/04 O/A at p. 4). Applicants respectfully disagree.

First, in the presently-claimed invention, the first zeolite catalyst is used to form a first product and the second zeolite catalyst is used to convert the first product to a second product. Thus, contrary to the examiner's contention, the two catalysts in the method of the present invention are used for very different purposes. Accordingly, *In re Kerkhoven* is inapposite, and the withdrawal of this rejection is respectfully requested.

Further, no motivation exists, express or implied, for modifying the disclosure of Brown et al. to arrive at those features not disclosed in Brown et al. For this reason also, Applicants respectfully request the withdrawal of the rejection of claims 1-4, 6 and 9-14 in view of Brown et al.

B. No Motivation Exists for Combining the Leyshon Disclosure with the Brown Disclosure.

Claims 1-4, 6, 9-11, 13-18, 20, 22 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Leyshon et al. (U.S. Patent No. 5,026,936) in view of Brown et al. Applicants respectfully traverse this rejection.

As indicated above, independent claim 1 includes the step of contacting an oxygenate feed with a first zeolite catalyst comprising a ZSM-5 molecular sieve to form a first product. At least a portion of the first product contacts a second zeolite catalyst comprising a zeolite molecular sieve selected from the group consisting of ZSM-22, ZSM-23, ZSM-35, ZSM-48, and mixtures thereof to form a second product.

Similarly, in independent claim 15, an oxygenate contacts a first zeolite catalyst comprising a ZSM-5 molecular sieve to form a first olefin product. A butylene containing stream is separated from the first olefin product, and is contacted with a second zeolite catalyst comprising a zeolite molecular sieve selected from the group

Amendment Under 37 C.F.R. §1.111  
Application No. 09/943,610

ExxonMobil Ref. No. 2001B081

consisting of ZSM-22, ZSM-23, ZSM-35, ZSM-48, and mixtures thereof to form a second olefin product. Thus, both claims are directed to converting an oxygenate to a first product over a first catalyst, and then converting the first product to a second product over a second catalyst.

In contrast, Leyshon is directed to a method for selectively producing propylene from heavy hydrocarbons. The method includes a step of cracking C4+ hydrocarbons over a zeolitic catalyst such as ZSM-5 to form ethylene, propylene and butene. The ethylene and butene are separated and metathesized over a metal-containing catalyst to form additional propylene. (See, e.g., Leyshon claim 1). Leyshon fails to teach or suggest forming a first product from an oxygenate over a first zeolite catalyst. Instead, the January 22, 2004 Office Action relies on Brown for disclosing the synthesis of C4+ olefins from an oxygenate over ZSM-5.

Applicants assert that, contrary to the Examiner's contention, no motivation exists for combining Leyshon with Brown. In the Office Action, the Examiner indicates that motivation exists to combine the references because they are both desired to produce propylene. (1/22/04 O/A at 5). Applicants disagree and submit that this combination of references is based in impermissible hindsight. Nothing in either reference, expressly or impliedly, suggests their combination to arrive at the presently-claimed invention.

A prior art reference must be considered in its entirety. MPEP §2141.03. Leyshon, viewed in its entirety, discloses using ZSM-5 to crack a C4+ stream. ZSM-35 as a catalyst is mentioned only once, in passing, throughout the entire patent. (See Leyshon at Col. 4, line 16). Further, the mentioning of ZSM-35 occurs embedded deep within a laundry list of other crystalline aluminosilicate zeolites. One of ordinary skill in the art would have absolutely no motivation to pick this one specific zeolite (ZSM-35) from the laundry list of other zeolites recited and combine that zeolite with the teaching of the Brown patent in order to arrive at the claimed invention. The Office Action does not attempt to provide such a motivation, instead asserting that the motivation for combining the *references* is based on a desire to form propylene. Applicants respectfully submit that the asserted motivation is inadequate in view of the entire disclosure of the

Amendment Under 37 C.F.R. §1.111  
Application No. 09/943,610

ExxonMobil Ref. No. 2001B081

Leyshon patent. Further, no alternative motivation exists for combining these references to arrive at the presently claimed invention. Accordingly, the withdrawal of this rejection is respectfully requested.

C. The Invention Provides Surprising and Unexpected Results

Further supporting the non-obviousness of the presently-claimed invention, the presently-claimed two step conversion process has surprising and unexpected results over the prior art. Such results rebut any *prima facie* case of obviousness that arguably could be established.

In Example 2 of the present application, an oxygenate contacted a P-ZSM-5 catalyst at about 560°C. The product was collected and a portion of it was analyzed to determine its content. The composition is disclosed in Column 2 of Table 2. Then, a portion of the product was contacted under the same reaction conditions as above, except that it was contacted with a second catalyst comprising ZSM-35. The astounding results are reported in Column 3 of Table 3. The final product showed more than a 200%<sup>1</sup> increase in ethylene yield. This result is surprising and unexpected.

In rejecting this argument, it was asserted in the January 22, 2004 Office Action that the argument that the claimed process shows unexpected results as shown in the example is not persuasive since the process in the examples was not commensurate in scope with the claims. Specifically, the Examiner apparently would require that the claims include each reaction condition from the example, e.g., temperature, delete the catalysts not in the example, etc.

Applicants respectfully submit that reciting each experimental reaction condition in the asserted claims is not required to obviate a rejection under 35 U.S.C. §103(a). Under the correct standard, "evidence of patentability must be commensurate in scope with **only that part of the claimed subject matter that is *prima facie* obvious**. Any requirement for a broader showing of patentability is a violation of 35 U.S.C. 103(a)." Harris A. Pitlick, "What Does 'Evidence presented to rebut a *prima facie* case of

<sup>1</sup> Applicants apologize for inadvertently misstating in the Amendment dated May 1, 2003 that the data in Example 2 shows a 300% increase in ethylene yield.

Amendment Under 37 C.F.R. §1.111  
Application No. 09/943,610

ExxonMobil Ref. No. 2001B081

obviousness must be commensurate in scope with the claims to which it pertains' Mean?" 85 JPTOS 257, 261 (March 2003) (emphasis in original); *In re Hyson*, 453 F.2d 764, 767 (CCPA 1972).

The examiner has asserted that the claimed two-catalyst system is *prima facie* obvious based on the disclosure of Brown (which discloses using ZSM-5 or alternatively ZSM-35 for converting oxygenates to olefins) or Leyshon (which discloses ZSM-5 or ZSM-35 for cracking C4+ hydrocarbons) in view of Brown. Brown and Leyshon fail to disclose the conversion of the first product (e.g., butylenes) to the second product (e.g., ethylene) over any of the other claimed ZSM catalysts (e.g., ZSM-22, ZSM-23, etc.). Thus, any evidence of non-obviousness need only show that the combination of ZSM-5 and ZSM-35 is not *prima facie* obvious. There is no requirement that Applicants relinquish claimed subject matter that relates to embodiments the examiner has not shown to be *prima facie* obvious (e.g., where the second zeolite catalyst comprises a ZSM other than ZSM-35). Limiting claim 1 or claim 15 to those specific conditions in Example 2 of the application is not required under 35 U.S.C. §103(a), and Applicants respectfully submit that the evidence of surprising and unexpected results successfully rebuts any arguments that the pending claims are obvious over the references of record.

A Declaration of Luc Martens under 37 C.F.R. §1.132 is being filed concurrently herewith to further support the non-obviousness of the present invention.

Based on the above arguments, it is respectfully submitted that neither the Brown et al. patent nor the Leyshon et al. patent, alone or in combination, render the invention claimed in claims 1 and 15 of the present application obvious, and the allowance of the these claims and the claims depending therefrom is respectfully requested.

## CONCLUSION

Applicants respectfully request allowance of the pending claims in light of the above amendments and remarks. Applicants invite the Examiner to telephone the undersigned attorney if there are any issues outstanding which have not been presented to the Examiner's satisfaction.

Amendment Under 37 C.F.R. §1.111  
Application No. 09/943,610

ExxonMobil Ref. No. 2001B081

The Commissioner is hereby authorized to charge any additional fees that are required or credit any overpayment to Deposit Account No. 051712 referencing 2001B081 US.

Respectfully submitted,

April 28, 2004

---

Date



Edward F. Sherer  
Reg. No. 29,588  
ExxonMobil Chemical Company  
4500 Bayway Drive  
Baytown, Texas 77520  
(281) 834-5933 Direct Line  
(281) 834-2495